



TRAIN THE TRAINER

WEBINAR



CompTIA Network+ N10-009 TTT Session 1:

Title

June 20, 2024

CompTIA®



@TeachCompTIA #NetworkPlusTTT

Network+ N10-009 TTT Session Outline

Date	Topic
✓ 06/20/2024	Introduction and Network Topologies
06/25/2024	Cabling and Physical Installations
06/27/2024	Configuring Interfaces and Switches
07/02/2024	Configuring Network Addressing
07/09/2024	Configuring Routing and Advanced Switching
07/11/2024	Network Security
07/16/2024	Network Security (Continued)
07/18/2024	Wireless Networking
07/23/2024	Troubleshooting and Management
07/25/2024	Emerging Technologies and Trends

NETWORK OVERVIEW



Network Overview

1

Explain network types and characteristics.

2

Compare and contrast OSI model layers.

3

Configure SOHO networks.

4

Explain CompTIA's troubleshooting methodology.

Network Types

What is a Network?: A network is a collection of interconnected devices that can communicate and share resources. Networks are essential in modern communication because they enable the sharing of information and resources such as files, printers, and internet connections, thereby enhancing productivity and connectivity.

Types of Networks:

- **LAN (Local Area Network):** Covers a small geographic area like a single building or campus.
- **WAN (Wide Area Network):** Spans a large geographic area, often a city, country, or even global connections.
- **MAN (Metropolitan Area Network):** Covers a city or large campus.
- **PAN (Personal Area Network):** Small network used for communication between personal devices, typically within a range of a few meters.

Think About It

How would you define your social network?



How are Personal and IT Networks Similar?

Social Network

A collection of friends, family, coworkers, and acquaintances

Provides emotional support, advice, and opportunities in personal matters

Helps in communication, information sharing, and social connections

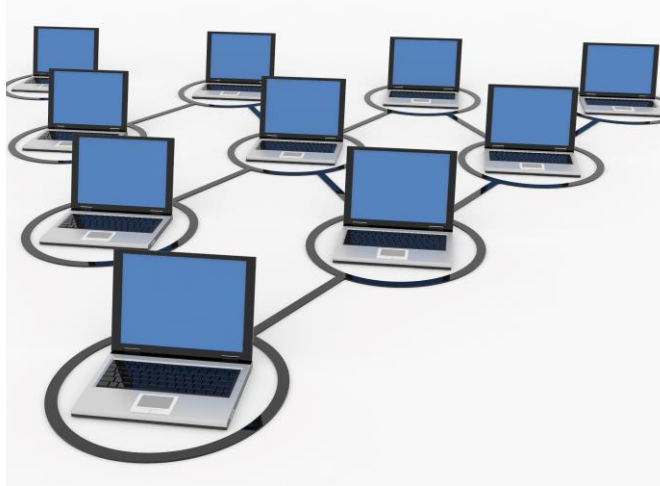
IT Network

A collection of computers and other devices connected by transmission medium

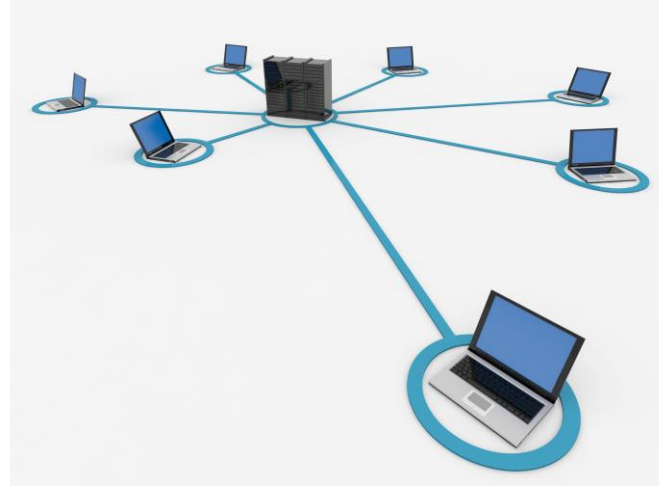
Provides an opportunity for shared resources

Helps with communication and information sharing in a digital environment

Networks



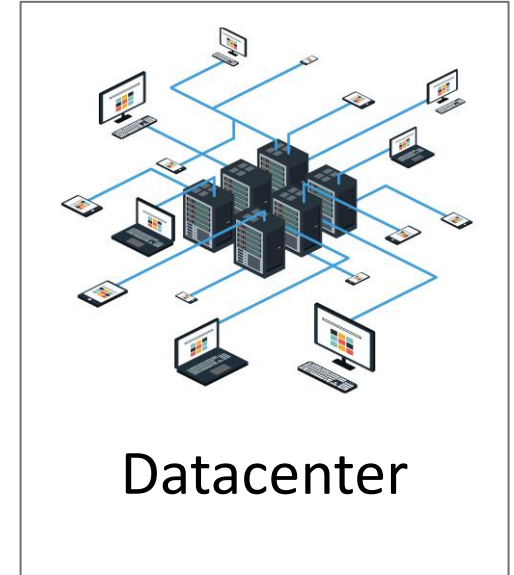
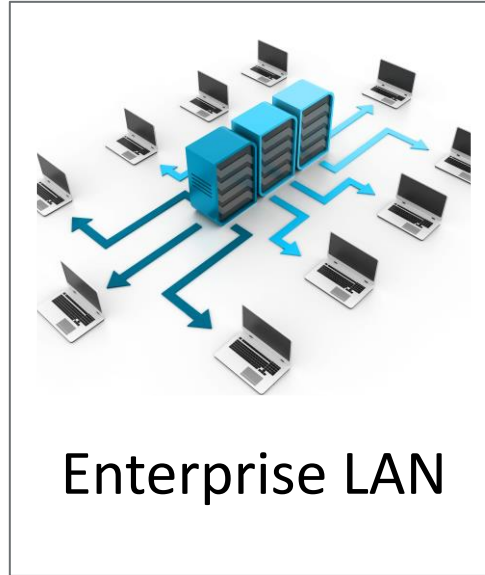
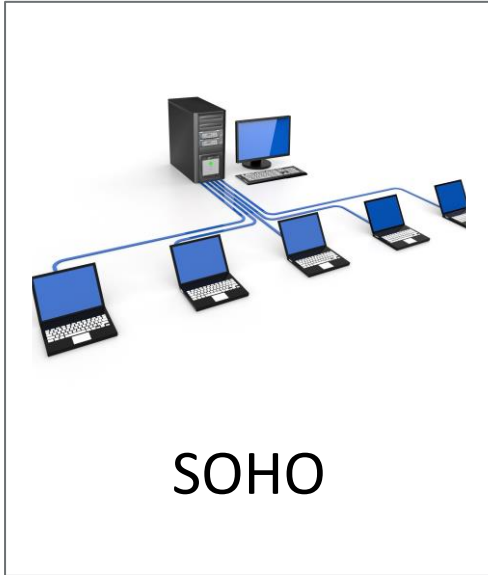
Peer-to-Peer



Client-Server

Local Area Networks

A local area network (LAN) is confined to a single geographical location.



Network Topologies: Point-to-Point

1

In a point-to-point (or duplex) network, only two nodes are connected to the network media.



2

When the network media is half-duplex, a node cannot transmit and receive at the same time.

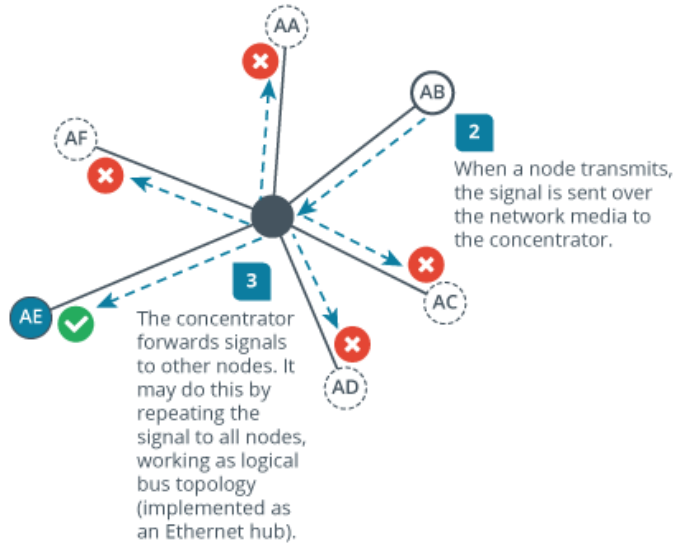


3

When the network media is full-duplex, nodes can transmit and receive simultaneously.

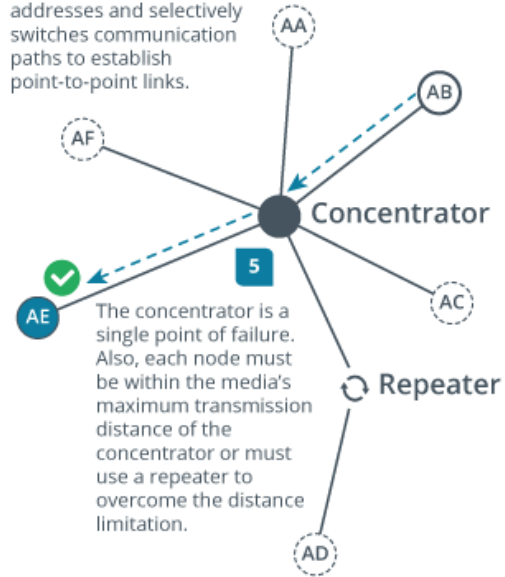
Network Topologies: Star

- 1 In a star topology, each node is connected to a concentrator over dedicated network media.



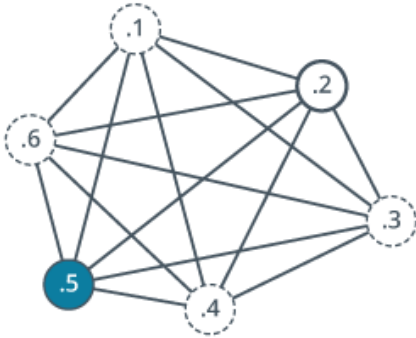
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More commonly, the concentrator tracks node addresses and selectively switches communication paths to establish point-to-point links.

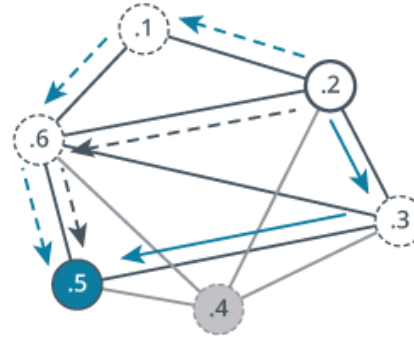


Network Topologies: Mesh

- 1 In a fully connected mesh network, each node has a point-to-point link with every other node. This requires exponentially more links as nodes are added: $n*(n-1)/2$



- 2 Provisioning so many interfaces and links is difficult, so partial mesh networks are often preferred. In a partial mesh, nodes can forward packets to a destination by learning the network topology.



- 3 Packets can take multiple routes through the network, providing resilience if some nodes or links fail.

Quiz 1



What is a network and why is it important?



Can you give examples of each type of network (LAN, WAN, MAN, PAN)?

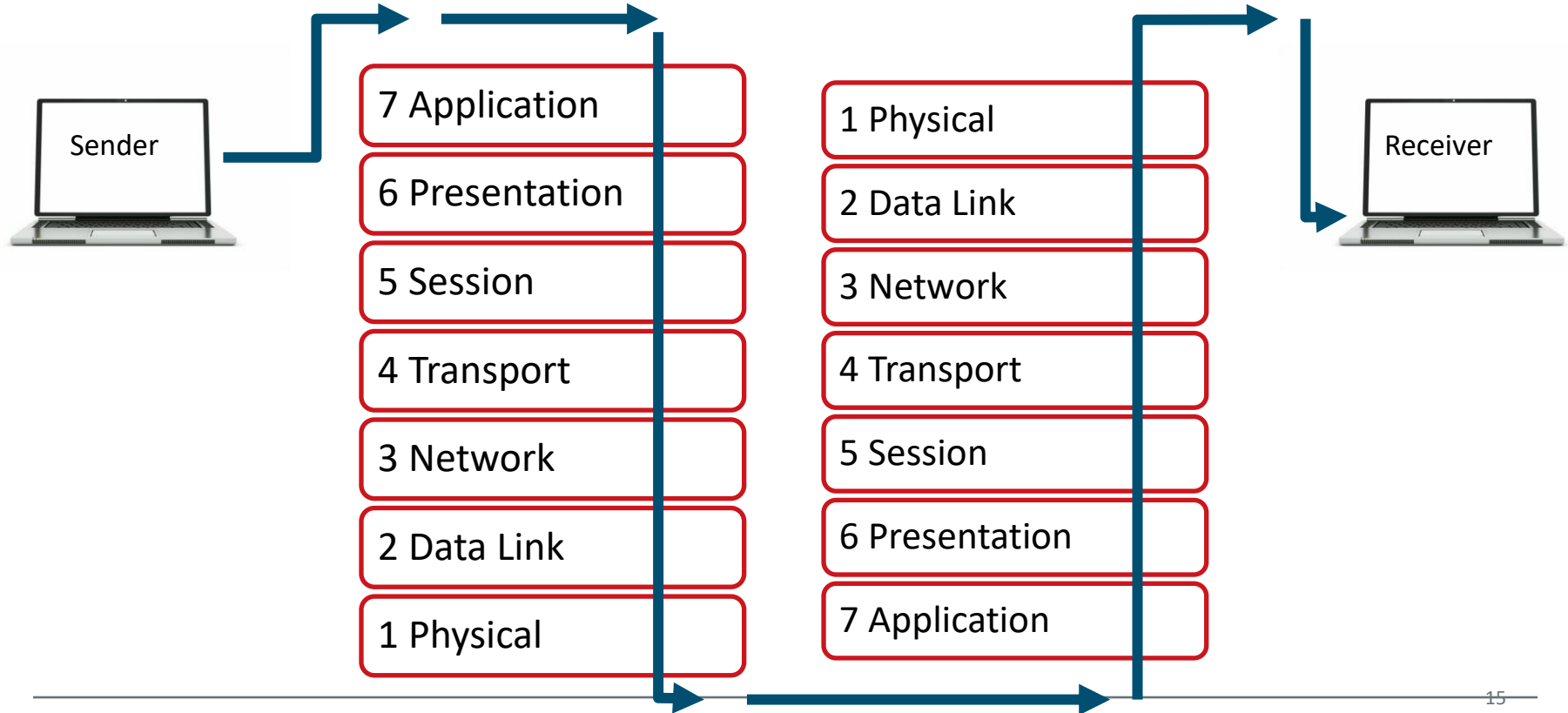


How does networking enhance productivity in a modern workplace?

OSI MODEL CONCEPTS



The OSI Model Packet Flow



The OSI Model Mnemonic

Please	Do	Not	Throw	Sausage	Pizza	Away
P	D	N	T	S	P	A
Physical	Data Link	Network	Transport	Session	Presentation	Application



Responsibility of the Network

Responsibility
of the Network



7 Application

6 Presentation

5 Session

4 Transport

3 Network

2 Data Link

1 Physical

Layer 1 – Physical

7 Application

6 Presentation

5 Session

4 Transport

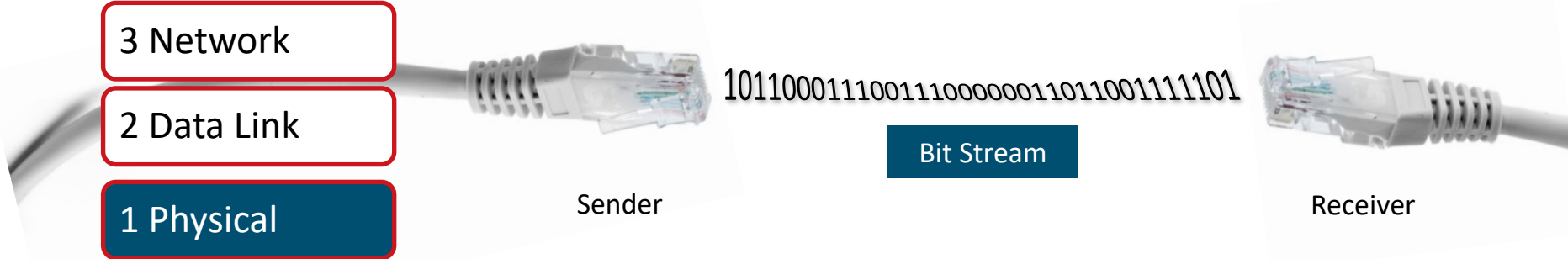
3 Network

2 Data Link

1 Physical

Functions and Examples

- Transmit bits from sending source over network communications to physical layer of receiving device
- Data transmitted using cables or wireless media
- Examples: Coax and fiber cables, hubs and repeaters, modem, transceiver



Layer 2 – Data Link

7 Application

6 Presentation

5 Session

4 Transport

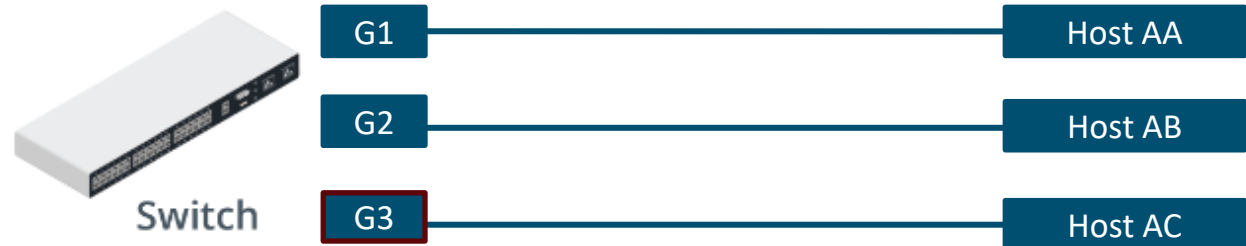
3 Network

2 Data Link

1 Physical

Functions and Examples

- Transfers data between nodes on the same logical segment using hardware addresses
- Encapsulation: organizes stream of bits arriving from the Physical layer into frames
- Examples: NIC, bridge, switch, wireless access point



Layer 3 – Network

7 Application

6 Presentation

5 Session

4 Transport

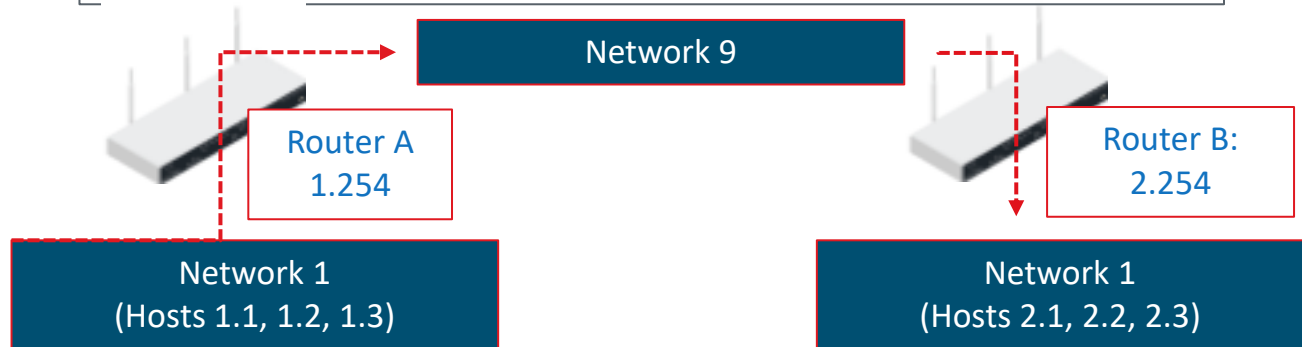
3 Network

2 Data Link

1 Physical

Functions and Examples

- Moving data around a network of networks using network and host IDs
- Packets given a destination IP address and forwarded to the destination network
- Examples: Router, IP, ACL, Basic Firewall



Layer 4 - Transport

7 Application

6 Presentation

5 Session

4 Transport

3 Network

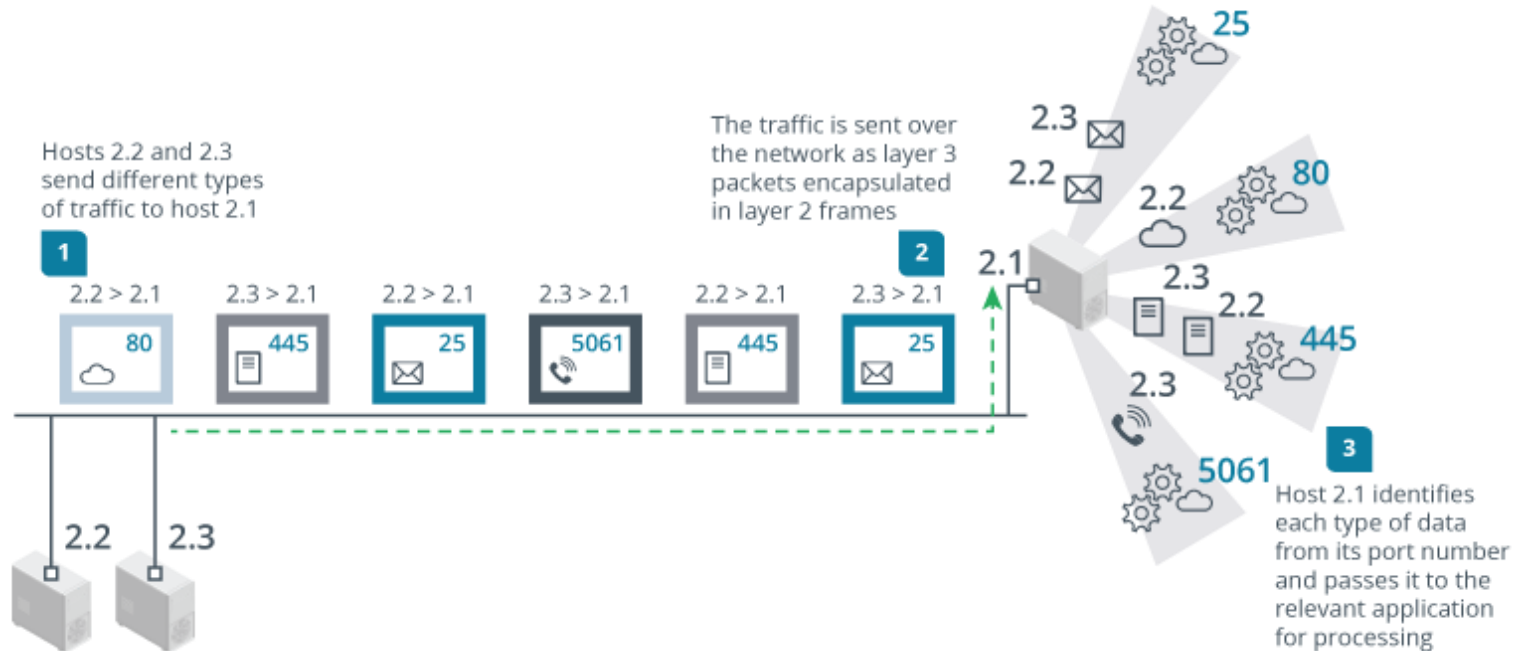
2 Data Link

1 Physical

Functions and Examples

- Tracks communication between applications on source and destination hosts
- Segments data and manages each data piece
- Reassembles segments into application data
- Examples: Multilayer switches, advanced firewalls, intrusion detection systems (IDSs)

Layer 4 – Transport



Layer 5 - Session

7 Application

6 Presentation

5 Session

4 Transport

3 Network

2 Data Link

1 Physical

Functions and Examples

- Establishes and manages the connections between applications
- Examples: ASP, ADSP, NetBIOS, PAP



Layer 6 - Presentation

Functions and Examples

- Delivers data across network connections
- Examples: MIME, Encryption/Decryption Services

7 Application

6 Presentation

5 Session

4 Transport

3 Network

2 Data Link

1 Physical

Application Layer Data

Presentation Layer
Encrypted, Encoded, Compressed

Session Layer Data

Application Layer Data

Presentation Layer
Decrypted, Decoded, and
Decompressed

Session Layer Data

Layer 7 - Application

7 Application

6 Presentation

5 Session

4 Transport

3 Network

2 Data Link

1 Physical

Functions and Examples

- Interacts directly with end-user's software applications for network service
- Examples: SMTP, DNS, FTP



Human
Readable

Machine
Readable

Quiz 2



What are the seven layers of the OSI model?



How do layers in the OSI model interact with each other?



Can you match a given protocol or device to its corresponding OSI layer?

SOHO NETWORKS

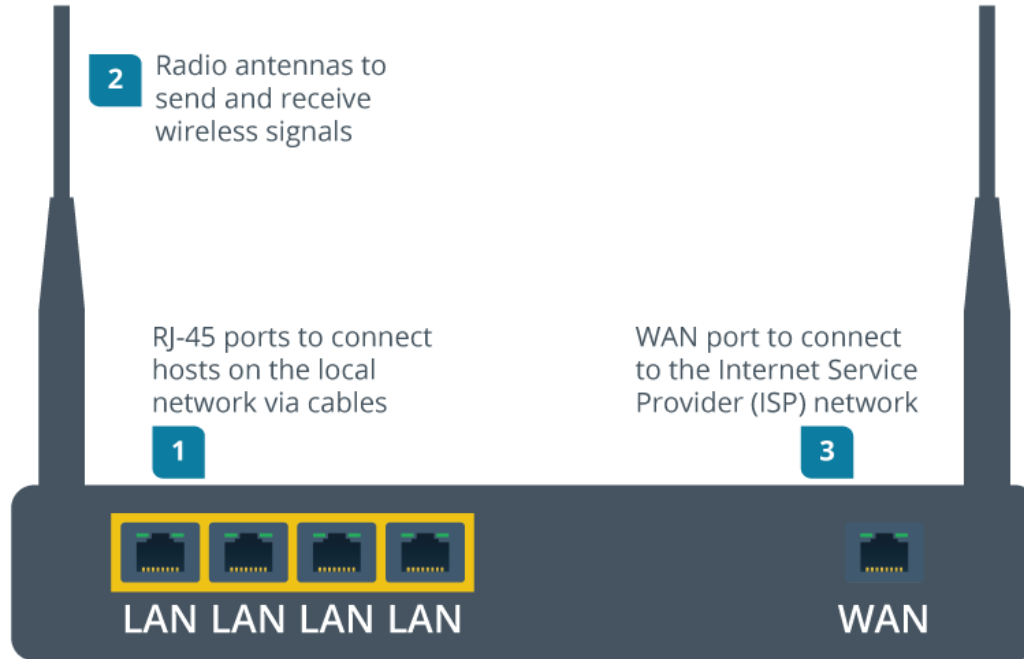


Think About It



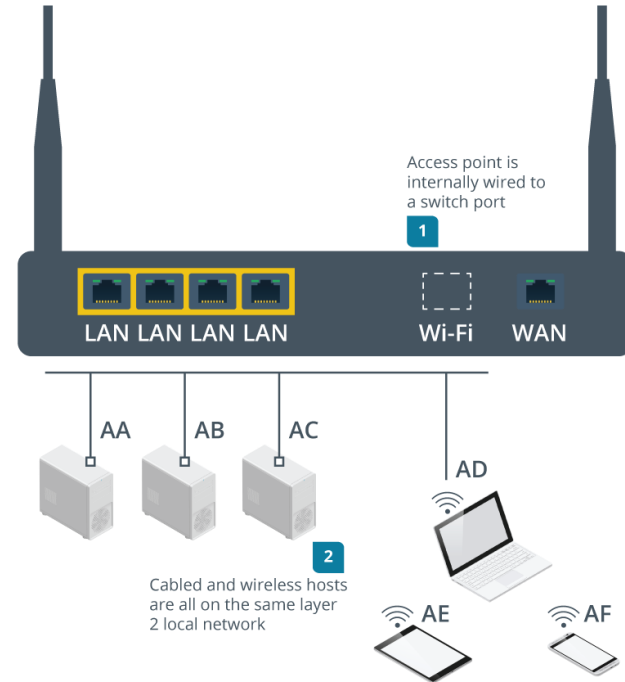
- What is a SOHO router?
- And what is it used for?

SOHO Router – Physical Layer



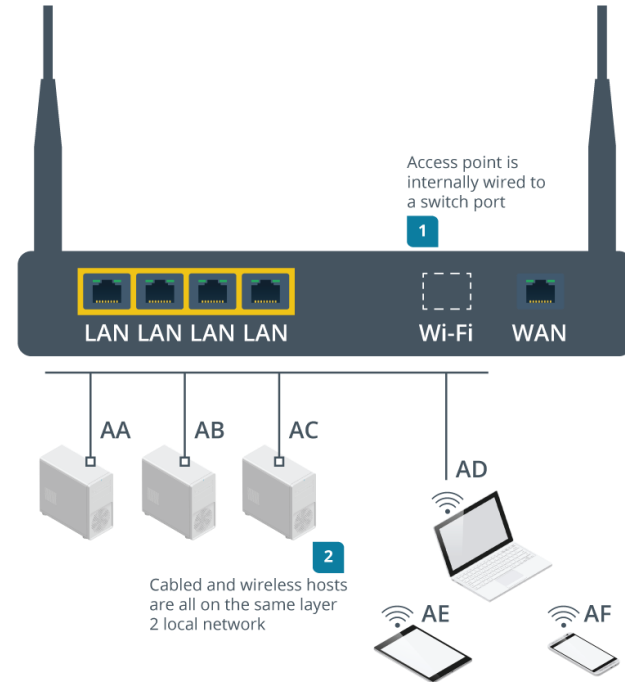
SOHO Router – Data Link Layer

- Ethernet switch
- Wireless access point
- Each host interface identified by a MAC address

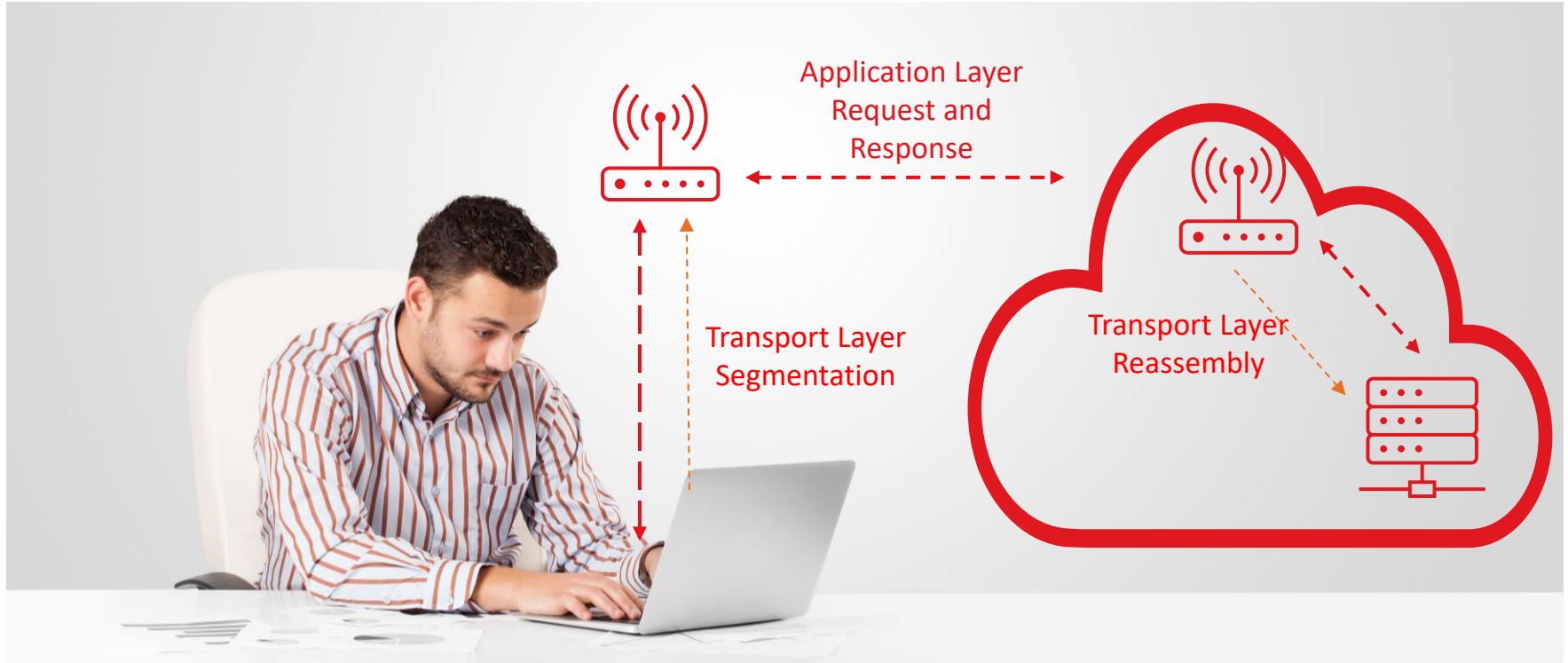


SOHO Router – Network Layer

- Forwards between local private network and public internet
- Runs a DHCP server to provide each host with an IP address
- Router's WAN interface given a public IP address



SOHO Router – Transport and Application



Quiz 3

01

What is a SOHO network and how does it differ from larger networks?

02

What devices are commonly found in a SOHO network?

03

Why is it important to consider scalability and security in a SOHO network?

LAB TIME | BUILDING A SOHO NETWORK



TROUBLESHOOTING METHODOLOGY



Discussion: Think About It

What is troubleshooting?

What steps should be involved in the troubleshooting process?



Troubleshooting Methodology



Identify the Problem



Gather information

- System documentation
- Installation and maintenance logs
- Vendor support sites

Question users

- Open questions to uncover information
- Closed question to invite a yes or no or fixed response

Identify Problem Symptoms

Identify symptoms

- Physical inspection
- Logs and diagnostic software
- Try to duplicate the problem

Determine if anything has changed

- Did it ever work?
- What has changed since it was last working?

Approach problems individually

- Verify symptoms are related before treating them as one single issue



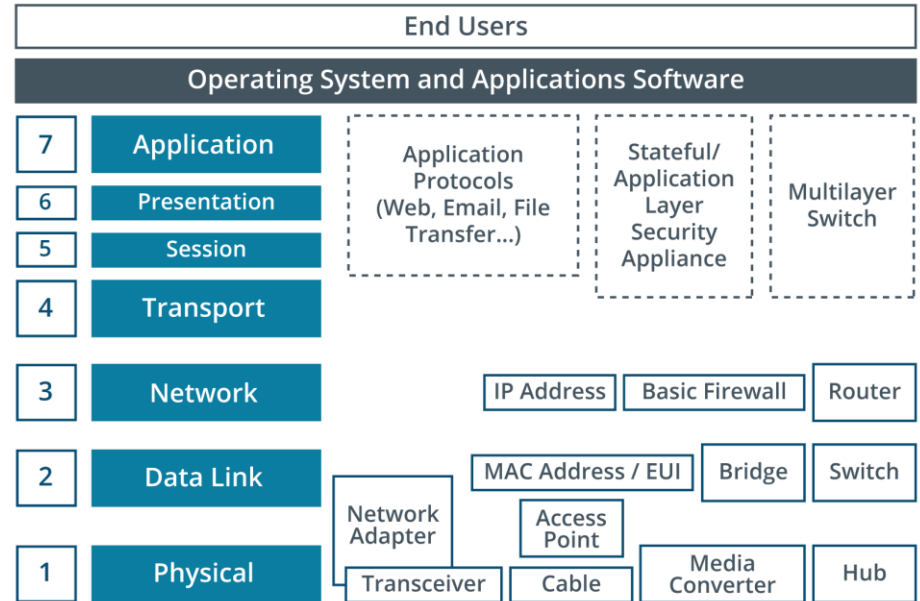
Establish a Theory of Probable Cause

Troubleshooting styles

- Question the obvious
- Methodically prove the functionality of each component

OSI Model Approach

- Top-down approach
- Bottom-up approach



Test the Theory to Determine the Cause

Question the obvious

- Use one or more method-based approaches
- Don't jump to conclusions

Escalation

- Problem is beyond your knowledge or ability
- Problem falls under a system warranty
- Scope of the problem is very large
- Customer is difficult or abusive



Implement, Verify, and Document

Implement changes

- Implement fixes
- Escalate if higher authorization is needed

Verify the solution

- Make sure the system seems to work for you
- Make sure the system seems to work for customer

Document

- Document findings, actions, and outcomes
- Logs are useful for future troubleshooting



Activity: Troubleshooting

Several office employees report their computers are unable to connect to the Internet, affecting workflow and productivity.



Quiz 4



What are the steps in a systematic troubleshooting process?



What are some common network issues and their causes?



How would you use tools like ping and traceroute to troubleshoot a network problem?

Summary

1

Remember OSI model's 7 layers (physical, data link, network, transport, session, presentation, and application)

2

Plan network structure and troubleshoot issues using OSI model layers

3

Implement methodical approach to troubleshooting (identification, planning, execution, verification, and documentation)

4

Use strategies like top-to-bottom, bottom-to-top, and divide-and-conquer

Discussion time: Please type your questions in chat

- Questions over content.
- Share you experience.
- What would you like to see different moving forward?

Thank You!



Let's keep the conversation going in the CompTIA Instructor Forum: <https://cin.comptia.org>